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Air Mail Hangars at Hadley Field By Night.

(c) William E. Arthur

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SPECIAL FEATURES

NUMBER
15

FLYING FIELD EQUIPMENT FOR AIR TRANSPORT
ANNUAL REPORT OF CURTISS FLYING SERVICE, INC.
THE LIGHTING OF THE LONDON-CONTINENTAL AIRWAY

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APRIL 12, 1926

AVIATION

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CONTENTS

| | | |
|--|--|-----|
| Editorials | 547 Flying Field Equipment for Air Transport ... | 553 |
| 1926 Activities of Curtiss Flying Service | 548 The Bristol Cherub Air-Cooled Engine ... | 555 |
| The Light of the London Continental Airway ... | 553 American Commercial Flying ... | 555 |

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AVIATION

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Balloon Racing

THIS PART year has seen a considerable revival in the sport of ballooning. There were two trophies given out into competition during 1925. These were the Leitchfield Trophy, the Major Thomas Baldwin Trophy, and the Detroit News Trophy. The last two trophies were contested for by balloons of 35,000 cu. ft. and under, the records being so established that this year the National Balloon Race itself (in which the Leitchfield Trophy is also contested for) has been changed to call for a 35,000 cu. ft. balloon of the big 30,000 cu. ft. balloons which have become the rule in this race. The National Balloon Race has been running down to the few older pilots who happened to have balloons of the required 35,000 cu. ft. size. This is too big for ordinary racing purposes, and hence new talent was correspondingly discouraged from entering. The change in rules this year has apparently already borne fruit, for the entry list shows the names of several pilots who have never yet competed in the National Race. It is to be hoped that the succeeding years will show a still further increase in popularity in a sport which is relatively safe and compares fairly low in cost and risk, at the same time. It is a means of accumulating most valuable experience in those fundamental sciences of meteorology and navigation which are the foundation of all aerial operations.

If the coming race from Little Rock is a success, it will be a considerable argument for changing, in similar fashion, the required size for balloons in the International Gordon-Bennett Balloon Race.

Commercial Speeds of 300 M.P.H.

ONE OF the most interesting fields for aeronautical production is the possible development of high flying planes for commercial use. For long distance flights, greater speed, steeper climbing, and freezing winds could be obtained, but the problems to be met are many.

Flying at 30,000 ft., an air tight cabin with normal ground atmosphere pressure would have to withstand a crushing force of 13.01 lb. per sq. in. By making a cylindrical case of a diameter of 8 ft., with three-quarter ends, so that all parts were in tension, a safety factor of four could be obtained by using about four times as much of steel as is. As such thicknesses are common practice in flying boat hull construction, it is fairly obvious that weight would not be prohibitive.

By using a wind driven air pump, normal pressure could be maintained in the cabin and fresh air supplied. Temperature at 30,000 ft., very soon about 50 deg. Fahrenheit, at the equator no -70 deg. Fahrenheit, in the temperate zone. The compressed air from the supercharger would be heated only with the exhaust heat and auxiliary preheating, the cabin could easily be kept warm.

At 30,000 ft., the air has about 1/3 the ground density, and the plane would have to travel at 2.50 times ground speed to maintain itself in the air. Although the flight drag ratio remains as 1.00 as a given time to stay in the air and, thus, would require 2.50 times the power necessary to keep it at the air of ground level. However, to attain the same high speed at ground level would require about fifteen times the power. The power lossing both, of necessity, is very low, a fact which is probably the most serious problem from the commercial standpoint, as it limits both the length of the flight and the useful load.

The most difficult problem to be tackled is getting and delivering the power at these altitudes. Fortunately for the advancement of aviation, McCook Field has done long an unusual amount of work along these lines. The supercharger has been developed to a point where it comes in to its fortunate to claim that full power will ultimately be developed at 30,000 ft. McCook Field engineers have built propellers of great diameter and area, they have built variable pitch propellers and, perhaps equally important, they have built and applied to engines a change gear mechanism so that a geared propeller can assume a desired drive propeller. Latin American wind conditions are very great heights, but, owing to existing knowledge, it can easily be said that between 30,000 ft. and 35,000 ft., favorable as regard winds can be found in the course can be varied from southern to northern routes. In the region of the trade winds, for example, five different general layers of wind direction have been noted. These stratospheric winds are much more regular than the surface winds, and their velocity is higher though not as high as popularly supposed.

There are safety problems, both minor and major, which must be solved satisfactorily before flying at great altitudes is really practicable, but there is no reason to believe that these will not be solved within the next generation. Sooner or later New York and London in Pacific ocean traffic.

Another Arctic Party Leaves

IN THE afternoon of April 5, almost at the moment of departure owing to poor weather, the Byrd Expedition left Brooklyn's Naval Yard aboard the steamerboat Captain, on the voyage to King Bay, Nyctherenge which will be the base from which extended flights onto the Arctic continent will be undertaken. Sledges have been built and completely equipped as expeditions set out upon any mission. With Wilson already in the North and the Amundsen and Byrd expeditions on the way, and the All-American University Alumni expedition planning to leave in June, there would seem to be every likelihood of some very real and valuable information serving man such a concentrated attack upon the "coverts" of the Arctic regions.

1925 Activities of Curtiss Flying Service, Inc.

One of America's Largest Aerial Service Companies Reports Prosperous Year.

By C. S. JONES

In THESE days when sensational controversies are all the rage and when an aerial "expert" knowledge of a controversial subject is published that the layman cannot help but be confused, it is interesting and sobering to find a report based on actual operating figures that cannot fail to convince those who believe that there is no commercial possibility in flying that it is the report of the Curtiss Flying Service, Inc., of New York.

The company was formerly known as the Curtiss Aeroplane Company, established in 1919 by Mr. Glenn H. Curtiss of Hammondsport, with the purpose, as the original incorporation papers state, "to stimulate interest in aviation by demonstration and exhibition by aerial flight." The Curtiss Aeroplane Company was merged with the Curtiss Flying Service, Inc., in 1923, and the name of the new organization was changed to Curtiss Flying Service, Inc., when the Government itself started to train fliers in quantity. In 1925 the Curtiss Aeroplane & Motor Co., Inc., felt the need of a flying organization to demonstrate and test machines, so the old Edgerton company was reorganized and, from that date, had expanded gradually until it fell of commercial flying to run an aerial school. It was then determined to change the name to "Curtiss Flying Service, Inc." as being more indicative of the nature of the work.

The Year's Statistics

The report of this company for the past year shows a total of 1,000,000 miles (approximately 150,000 hours), 1,000 hours of which was paid commercial flying, totaling approximately \$69,000—a gain of more than 33½% over 1924. The flying time was divided as follows:

| FIFTEEN HUNDRED FLYING HOURS | |
|------------------------------|-----------------|
| PAYS FLYING | NOT PAYS FLYING |
| Instruction | 1000 hrs. |
| Commercial | 150 hrs. |
| General passengers | 100 hrs. |
| Curtiss Flying Service | 100 hrs. |
| Photography | 100 hrs. |
| Air racing | 100 hrs. |
| Flight tests | 100 hrs. |
| Flight racing | 100 hrs. |
| Total | 1500 hrs. |

Roughly enough, the money derived from these separate sources, i.e., passenger instruction, and cross country flights, over the past year, less than \$100.

The principal expense for regular pilots, one pilot instructor, two mechanics, two helpers, and one cook. The company has a unique place for obtaining extra labor at small expense. There are hundreds of young men throughout the country who wish to learn to fly but have not the necessary means. After a careful investigation, the most deserving and most capable of these are employed for a period of three months or more, paid, during their work, as they never are paid off. In return for their services these men are given the regular flying course. At the end of the period, the most efficient are generally placed somewhere in the organization although there is no guarantee of such a position. There is always a waiting list.

Equipment

The inventory shows eight planes, JN's, Standard, Gospal, one seaplane, and a D.G. with the necessary spare wings. It is anticipated that the Lark, the new commercial machine developed by the Curtiss company, will be used extensively in 1926, thus increasing the operating possibilities because of its increased speed and carrying capacity over the present machines.

One machine was lost during the year when an experimental propeller broke in the air and the pilot was forced to land in the ocean to avoid crashing bottom on the beach. The machine was salvaged but the salt water and tough waves had damaged it beyond repair. The only injury was sustained by one of the pilots while taking instruction on the

airplane. While landing on the water, the rudder of the plane was ruptured and the machine went over, breaking the pilot's leg. Two such severe accidents in 170,000 miles of flying is an excellent record. In fact, during the seven years of operation, never over 750,000 flying miles, the company has never had a fatal accident. This record stands in鲜明 contrast with that of any other method of transportation.

Sixty students were taught to fly and a large percentage passed the P.A.L. and given by the National Aviation Association. Over four thousand passengers were carried, mostly on the popular 15-hops of ten miles. In the serial photo-



Curtiss Flying Service

graphic field, the company does no aerial photography but furnishes the firm service for all the large aerial photographic surveys.

The company is also in business about the 400 by 1,000 as commercial flying. This is probably the most interesting of the activities and clearly approaches the field of commercial transportation, which is the big future of the airplane. At the time of the eclipse, eight planes left Curtiss Field with photographers, reporters, and scientists, to observe the phenomena from the air. This was particularly noteworthy as

the thermometer registered zero, engines started with difficulty, and yet every machine that was scheduled was in the air en masse. Five machines covered the inauguration of President Coolidge at Washington, D. C., and the opening of the Olympic Games at Cleveland, Philadelphia, New York and Boston. The tour ended as an important stop in commercial aviation in that the Army and Navy, in spite of great political pressure from congressmen and newspapermen, cooperated with the flying magazines in refusing to supply Government planes for carrying these guests and thus in direct competition with the company.

A young flier deserved a medal for the Kentucky Derby. Pilot and partner were down in Penns' City at the death of Floyd Coffey. Three machines flew the race between the Kentucky Century Limited and the Woods brothers.

Only Possible by Air

Major John Smith of Detroit, was the guest of the New York Fire Department at a banquet in New York last night and speaking engagements in Detroit the following day. The services did not only benefit from the visit but the world efforts to keep him safe.

He attended the banquet in New York, left Curtiss Field at 6 a.m., slept most of the way to Detroit, had time to have lunch with Major Leopold, then superintendent officer of Midway Field, and arrived in Ford Airport at noon for his speech.

The son of Dr. James Stillman was injured at the Diamond Match Company's plant in Newark, N. J. Mr. Stillman is a well-known New York and a physician who flew direct to the camp, making the journey in six fifth of the time possible by any other means of reaching the camp and in about the same time the local physician would have taken by boat.

Hours before the man on the street had heard of the Diamond Match accident, two young Curtiss fliers, Mr. and Mrs. Edward G. Keyes, were flying over the Bronx in bringing back pictures of the wreck. Six planes belonging to the Curtiss Flying Service, Inc., covered this disaster, flying more than 2500 miles in two days and each one accomplished its mission successfully.

One enterprising flier selling lunch wagons chartered a plane to take them into manager to a restaurant in New

Hampshire, thus getting the "top" of his competitor and sold two wagons before they even arrived on the ground. The handbill series, flightless games, last man, last survivor, etc., were all the rage in the early days of the service, and were carried by coaches belonging to the company. Little does the layman realize to what extent modern agencies go to serve him his needs quickly.

Curtiss Flying Service, Inc., had one of the winning entries in the Ford Tour and its racing team took first place in the 1925 Indianapolis 500-Mile Race. The Curtiss Aeroplane Trophy race at the Pulitzer Races, Illinois, was also contested at various other meets at Miami Field, Daytona Avenue, Board, etc.

Bursting Operations

A new and what promises to be a productive field was entered during 1925 in the district of northern New Jersey by a number of organizations who gave to the Greater Association of New Jersey which planned immediately that this week could be done at a great saving of time and expense by the use of the plane. This method has been successfully applied to action and these would be as certain and free methods as could be expected in this manner.

Space does not permit of a more detailed account of the various activities of the association but suffice it here to say that the over expectation was that the airplane is here to stay. The most encouraging fact is that each year since 1918 has shown a steady increase in the volume of business and an ever increasing confidence in the part of the public to let the airplane commercially, and this without any law or Government assistance.

Furthermore, this increase in business, as the Curtiss Flying Service, Inc., has not attempted to get new business by every conceivable method. In fact, the various organizations have been to refuse as a hobbyist for clubbing deer or hunting operations for selling purposes as a money making proposition. With the country and Congress alive to the possibilities and need, as they are doubtless we today, of aviation, and with their apparent willingness to let all constructive assistance, it would seem that the prospects in the near future are extremely bright.

Pitcairn Organization Dinner

The safety of flying and forums of greater public appreciation of flying were discussed by speakers at a dinner of the Pitcairn Flying Corporation, organized on March 15 at Harborside Inn, Hoboken, N. J., near Philadelphia, at which 41 workers were guests of Harold F. Pitcairn, president.



The Pitcairn dinner. Left from the left in the back row are: Jerome G. Keyes, operations manager; Harold F. Pitcairn, president; John B. Langtry, publicity manager (frontmost); Agnes E. Larson, chief engineer; and Capt. Robert W. A. Dryer.

Know Flare, consisting of a metal frame on which an adjustable报复性 antenna with lamphouse at its apogee when retracted, housing for some time a half hours on one setting. This latter system is used at Lyons, where night landings are infrequent, and is satisfactory under certain conditions.

The floodlight system has been in use at Cologne for some years, the equipment being of the general type using incandescent lamps. The lamp projectors are mounted on the back of a 500-watt lamp, composed of twenty two incandescent lamps, and having, in the dual center, a carbon arc of the high intensity type, taking 1500 amperes at 1675 volts. The beam dispersion light through about 120 deg. so intense that it is possible to lay it up to within the horizontal plane. The lamp and the signal and dispersion glass, a lens, lamp, switch, and current control mechanism, etc., are mounted on a swivel board as a motor unit, and the lamp mounted on a four-wheelled truck at a height selected for better sheet illumination.

Electric Supply.

The necessary electric current is provided from two 10-kw generator plants placed on each of the North-South East and West sides of the field, and connected to the floodlight by underground cable. Street lights are fitted along the landing track for the lifting of the light beam in illuminating the shadows caused by obstructions in the landing area, which moderately from time to time has one very marked ridge running North and South that was originally a Roman road and which, in modern days has crept up a few inches in height.

The illumination given by the floodlight reaches eight feet at a simple as fly work from the pilot's eyes point, and appears able to give a certain feeling of confidence and safety to the average passenger, also the white and uniform clarity obtained below and is expressed by the simplicity and ease of night operation.

The principal application to the night-pilotage use of floodlights of the type, of course, is in the landing run. It has been found necessary to employ three lighting operators for the Cologne light and, although these are used on other such

as well, there still remains a fairly high wages charge against the use at the floodlight, gasoline, oil, water and spare parts also represent a somewhat costly bill in the running of the equipment.

With regard to night landings at Parchim and Lübeck, the necessary ground illumination is provided from the aircraft itself in the form of Hale lamps of the Tron-Dreipol type, carried in brackets attached to the lower planes of the craft. There are two sets, an upward set, tilted at 60°, and one set, the rear one of each pair having a burning period



The extensive illuminated signal director indicator

of 10 sec. and 1 min. This is used for clearing the path leading up or landing a field when circumstances require that the aircraft, while the second lamp, burning for 10 sec. and 1 min, is used for the landing.

The light given by these three is adequate in all respects,

although there has been much discussion regarding the fire risk introduced by these, the writer has never yet

been able to find a definite rule where it could even be reasonably assumed that the fire was caused by a light bulb.

There remains to be discussed the lighting equipment itself as concerned airports in England, and the various systems of lighting used. It is not necessary to say very much, as no new evidence and no results, but again this does not prevent of this being done in the present issue.

Improvements in Dope

By W. H. MUNNINGS,
Chief Clinical Painter, M.G.C.

Dope has been one of the important factors in the development of the airplane and maintaining the present high standard quality of the essential structural and repair materials, however, research is continually going on to improve the quality and work new conditions and needs on them, arrive.

The Farnborough M.G.C. dopes have been forced into refinements of this class of material for the past 15 years, particularly in the last 10 years. The early Farnborough sealant and dope, moreover, a research and experimental laboratory, working all the time on the new and interesting problems which arose in connection with their work.

The company has developed a new type of pinoleum dope, i.e., one giving a gloss finish. The present practice in applying is—four coats of dope (Army—air) varnish (Army—air) varnish—two coats and two varnish followed by two coats of pinoleum dope, generally silver drab or yellow, although the measured manufacturers are more and more using special colors—grey, blue, sand, etc., which give an attractive, bright and distinctive appearance.

Using the present type of pinoleum dope gives a somewhat matt finish. This gives a strong attraction to a distinction in that it is not covered by oil, dirt and grease. The varnishes have a virtue of giving a good coat of varnish, particularly for protection, and, which makes it much easier to wipe off any paint, and, moreover, a snappy, clean appearance. This varnish can, however, viscous disadvantages. In the first place,

the useful life of the paint is decreased considerably, and the varnish has only moderate durability under the intense sunlight to which a plane is exposed, the adhesives between varnish and metal deteriorate as varnish and dope in more or less good. It takes a great deal of time to remove the varnish. Also, when the varnish fails to dry it is extremely difficult, if impossible to remove it from the fabric and leave the cloth in proper condition for re-doping.

The new glossy pinoleum dope of the Farnborough M.G.C. takes the place of the ordinary pinoleum dope, the durability of which, in general, is far exceed dope and this sort of dope is not suitable for any aircraft, unless entirely doing away with the varnish and varnish.

This gives a glossy finish, which is readily cleaned off oil and grease, and saves the weight of an additional coat of varnish, and the labor and expense incident to its application and in much more durable. This new glossy pinoleum dope is also satisfactory for application to wood and metal and previous processes, making possible a one color finish for the complete airplane.

More on Dope

BY GENE AND TERRY APPERTON, By G. P. Young, and C. W. Young, Air Service Laboratories, Princeton, N.J. Printed by U.S. Air Service Laboratories, Princeton, N.J. 14 illustrations.

A few years ago the author of this article, after much consideration of the essential constituents of clear and pinoleum dopes, discovered that the best dopes were those which contained the following percentages of clear and pinoleum dopes. Doseine are given for the storage of dope, and for their application both with a brush and with the DeVilbiss spraying-system. Protection that should be taken in painting a fabric that has been treated with a pinoleum protective covering are also indicated.

Flying Field Equipment For Air Transport

By ARCHIBALD BLACK

Aerospace Engineer With E. A. Arbus & Co. and Consulting Air Transport Engineers

IN CONSIDERING the technical requirements of air transport fields and their equipment, it is important to remember first the design specifications which apply to the particular aircraft to be used. In the case of monoplanes, the aircraft's weight, and the type of equipment, size of buildings and other such matters are taken into account. It becomes necessary to work out the complete investment and operations analysis for the specific project under consideration. No generalities can be given, as the type, size and number of aircraft, engine, etc., will affect the type and cost of the equipment required. The number and kind of transports to be housed, the type and amount of maintenance work to be carried out at the field, the class of traffic and many other factors. Each of these elements must be settled by developing an operations analysis and working up the actual requirements, which may vary with many field situations.

Emergency Lighting Equipment

The construction and operational requirements of air transport fields are affected by many elements, among which the following might be listed as the more important. The order in which these are given, it should be noted, is not intended to suggest their relative importance of the legends greatly upon the characteristics of the project.

Rubberized fabric, Ryton, Phenolic resins, etc.

Number of airplanes in service, etc.

Number of passengers per hour, per minute, etc.

Amount of cargo and supplies carried each day in tons or dollars.

Size of storage tanks, etc., and quantity of fuel.

Size of hangars, etc., and quantity of fuel.

Size of buildings, etc., and quantity of fuel.

Size of structures, etc., and quantity of fuel.

with funds that they are allowed to spend in permanent site selection as frost, salt marshes, power companies, or other public authorities. At the same time, it must be made to provide against eventualities in the effort to accomplish. Two roads against enemies may prove later to be merely futile exercises. The slightly lower cost of the lighter performance buildings makes them less seem very inviting at first. However, it is both inviting and expensive to build, at same time note that the roof timbers are too light to carry the



The Traffic Movement Board at the London Airport, Croydon, England, upon which the positions of soldiers along the route are marked. The positions are covered by rods.

Type of Hangar Buildings

The buildings which are usually provided at air transport operating fields, will always include hangars and it is pertinent here to describe these by individual and of modern designs. Air transport operators are seldom so well equipped



Closed Air Mail field by night. The plan of the B.D.T. flood light can be seen across the field, though the light itself is not visible in the picture.

The matter of space, height and floor area, depend upon the exact requirements of the project but it is well to note that the hangars should be designed for the exact type of craft which they are to house, keeping at the same time no space for possible future developments.

For example, aircraft which are always required, it will usually be necessary to provide sleep spaces or storage areas but can be required and engine overhauls. In some cases the larger space may be used for this work, while, in others, it is desirable to provide other buildings. Frequently it becomes advisable also to provide garage spaces, if freight or package traffic is to be handled in any volume, it may be necessary to provide a place where dangerous materials are handled, stored and sorted. These provisions must be made for a field after, even if this means a variety of air carriers on the longer or a less frequent air route. If passenger traffic is to be selected, it is desirable to provide a small waiting room and comfort station.

Industrial Equipment

The question of type of building for each building depends upon the particular needs of the project, the kind of buildings to be put up and the particular characteristics of the field as the project. Generally, wood floors are desirable for shops, offices and working rooms and concrete floors for garages and hangars. However, there are many exceptions and sometimes concrete floors are desirable for hangars which are not to be used very extensively. Loading should be provided on all buildings, particularly garages, so that the space required for workshops, offices, etc., should be heated. Whether or not the garages, hangars and such buildings are heated will depend partly upon the extent to which work is to be done in them. Table facilities must always be provided, even if it is necessary to make them very primitive.

Gasoline Storage and Equipment

The storage tanks for all types of liquids, will include such devices as siphons, vapor traps and automatic airplane-cleaning, operating and field maintenance equipment. These include as many small tanks that are reasonably to go into the body of planes as desired on the share site. In all cases gasoline and oil storage must be taken into consideration. Whether gasoline and oil are stored in an outdoor or an underground tank will depend greatly upon the cost of the tank or the cost of the piping system. A tank which is built into the ground is particularly desirable for gasoline storage but a small shed is often sufficient for the storing of oil, gasoline, asphalt, wing dope, paint and other inflammable materials.

The nature of what buildings are required outside of the buildings will depend upon the amount of weight flying vehicles require. If there is very little weight to be carried, the expenditures for this class of equipment will be cut down and save overheads provided instead of the more expensive items which would be represented in regular use.



Brown Brothers Dept. Marquette, Mich.

The whole problem of air transport flying field equipment has many ramifications, such of which calls for certain highly specialized knowledge. Thus, the various viewpoints need



The Weather Bureau at the Clouds Station

such as balanced against each other for every one requires a certain amount of organization. It is, therefore, desirable to overall the operation of flying field both roads and field maintenance equipment. Accordingly, special tools must be provided for the cleaning of the aircraft, including cleaning plane parts, the use of the to remove dirt, cleaning the propeller, etc., as required, instead of an expensive

The Bristol Cherub Air-Cooled Engine

A New Model of the Well-Known British Lightplane Engine Successfully Passes Stringent Tests.

AS A RESULT of the success of the original Cherub engine in the 1934 and 1935 Lympne Light Aeroplane Competition, the Bristol Aeroplane Co. of England decided to develop this engine further, with the idea of putting it on a basis equal to the best modern light aircraft engines as regards reliability and performance. As a result of extensive work, the Series III engine has been developed.

In the re-designing of the Cherub Series III engine, there has been provided a much improved cylinder cooling, a better oiling and bearing, fuel injection system, dry sump and double ignition pump. The capacity has been increased to 5225 cu. in. and a new type of carburetor and double ignition have been fitted.

Please Ask Ministry Test.

The engine has recently been submitted successfully to the Ministry of Civil Aviation for test. It has been found that it can run for an average period of 15 hr. each without any head, bearings, cylinder or replacements. On the last hour, the engine had 364.6 hrs. at 3260 rpm. The average fuel consumption throughout the test was 36.6 pints per 1 hr. per hr. and the energy of consumption 30.8 pints per 1 hr. per hr. At the conclusion of the test, the engine was stripped and found to be generally in excellent condition.

General Details

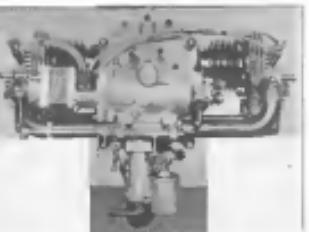
The "Bristol" Cherub engine is of the two-cylinder opposed type and has a total swept volume of just under 1200 cu. in.

The crankshaft is a one hundred slay steel and stamping of single dimensions, mounted in four bearings, the crankcase is an aluminum casting, split vertically in the engine center line and provided with separate front and rear covers.

There are three main journal bearings. The front one is at the drive gear case, located in the nose of the curved front cover, and transmits the propeller thrust from the crankshaft to the nose. The other two are of the double row

pseudo drives for the crankshaft, transmission and magneto power pump, respectively.

Connecting rods are alloy steel forgings with hardened heads, pinned into the big ends, the proportion of which are such that the rods may be flexed over the shaft. When in position, the split bronze bearing bushes are inserted and the two halves secured to each other by high tensile steel nuts which are locked by split pins.



The Bristol Cherub engine seen from the rear

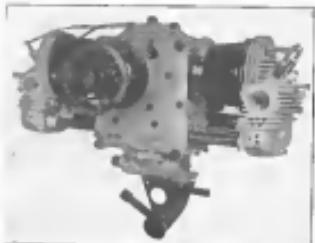
The piston are of aluminum alloy, fitted with three rings, the lower one of which serves as a scraper and returns surplus oil from the cylinder walls through drain holes in the piston skirt. The hollow galvanized cast iron bulk is in the piston houses and in the connecting rod steel ends and are locked sideways by bronze buttons pressed into their open ends.

Overcoming Expansion Differences

The cylinders have steel bases, but the inlet and exhaust passages are formed in the aluminum alloy heads which also carry the inverted air filter, valve seats, valve guides, valves and spacers. A deep spacer for the head is provided to give a clearance of 0.005 in. between the base and the head. The upper ring is operated and very carefully fitted to minimize clearance in the head and barrel flanges. As the rates of expansion of aluminum and steel are different, great difficulty is usually experienced in the manufacture of a really good joint with the type of head. In the Cherub heads, this difficulty has been entirely overcome by mounting piston heads on a steel base which has a rate of expansion equal to that of the cylinder heads, so that the joints are not subjected to any strain. The arrangement, combined with the copper ring joint, has proved so satisfactory that the rods of the heads are riveted over their seats, the head and barrel being secured as one unit which need never be disturbed. The cylinders are secured to the cylinder by a segmented and flanged joint, a Dremont ring, serving to make the joint tight.

Inlet and exhaust valves are of solid chrome steel and are interchangeable, and these respective springs are used on each valve. The valve operating gear is somewhat unusual and has distinctive features of considerable importance.

The camshaft, which, with its drive case is enclosed from the body, runs across the crankcase below the crankshaft and is driven by a spur gear pair of small diameter, the pinion being of the roller camber or self-centering type. The valves are operated by rocker shafts which run parallel to the cylinder



The propeller end of the Bristol Cherub engine

Plane Wire Handicap Race

An Annual Review

National Balloon Race

The following is a list of the official entries for the National Balloon Race for the Litchfield Trophy to be held at Little Rock, Ark., on April 29.

| FILE | NAME | FILE | NAME |
|------------------------|----------------------------|------|---------|
| WHITE A. BARK | Tobey J. Lohr | 4000 | Reardon |
| WHITE S. BETHUNE | Stephen D. Starnes | 4001 | Reed |
| WHITE & U. BARKERSON | Robert J. Full | 4002 | Reed |
| WHITE T. VANCE | Mac Donald Williams | 4003 | Reed |
| WILDE T. VAN DUSEN | Walter R. Norton | 4004 | Reed |
| WILSON JAMES P. PARISH | James Marion F. Kirby | 4005 | Reed |
| WILLIS WEN A. GENE | Ward Rosenthal | 4006 | Reed |
| WILLISTON E. COOK | William DeMille Whiting | 4007 | Reed |
| WILLSTROM T. NELL | Willard Terrell Oberholser | 4008 | Reed |

The first symptom of the disease is a slight pain in the upper behind the left ear. The swelling is in the ear, being so long as two months or many days, as a result making it rough and hard to get off at the mouth many nights. I tried salivation and early rising.

We did not have any electric service in the interior of Alaska but have
had some of these. The last B&B I visited gets its electricity from 1000 ft. deep
water well, a 100 ft. long tunnel and a water wheel to all the
lights and power needs. It has a 100 ft. long tunnel to the well, 25 ft. to the
wheel, 100 ft. to the generator, 100 ft. to the lights, 100 ft. to the
water pump, 100 ft. to the water tank, 100 ft. to the water well.
The water well is about 100 ft. deep with the top taken underground so it
is gravity fed and the days were getting short.

Hibben Prog. Does Its Stuff
Another right-on-the-money speech is a talk given by the Hibben Progressives at their meeting last Saturday night. The speaker was a man who had been a member of the Hibben group since it was first organized, and he spoke with great knowledge and enthusiasm about the work of the Hibben group.

This plot is a small one and it is not possible to have many observations. We therefore make a random sampling method and draw at a time four sites with the small error type which contains a unit in the form place located by the use of a site label with the letters A, B, C, D. The location of the four sites is shown in Fig. 1. We then find the mean value of the four sites with a short time interval in each. We will call this the working place which does not exceed 10 m² and it is about 10% of the area in the field. We then take the mean of the four sites as the mean value of the field plot around the location of the working place.

April 13, 1996

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AND RATES ON OUR FLYING COURSE

CURTISS FLYING GARDEN CITY *Curtiss* SERVICE, INC. NEW YORK

American Commercial Flying

More Mileage Statistics of Commercial Pilots Operating Throughout the Country.

IN LAST week's issue of *AVIATION* there were published two pages of statistics of the mileage of American commercial pilots operating throughout the country. The mileage total, up to that time, was 4,065,655 miles and below will be found the additional reports which have been received to date. These total 1,055,300 miles, bringing the aggregate total up to 5,120,955 miles.

Owing to an error which prevented sufficient space being provided for the publication of the entire list last week, the totals of Texas, Cal., Virginia, Washington, West Virginia, Wisconsin and Wyoming were unfortunately omitted and are, therefore, printed below individually.

Statistics

Continued from Original List

| | | | |
|---------------|------------------------------|--------|----------|
| TEXAS | Ed W. Klemm | 46,000 | |
| | John W. Maxfield | 10,000 | |
| | Louis E. Knobell | 1,700 | |
| | General Motor Transport Co. | 12,000 | |
| | Commercial Air Transport Co. | 12,000 | |
| | Trans World Airlines | 4,000 | |
| | Trans World Airlines | 25,000 | |
| UTAH | J. H. Wagner | 8,000 | |
| | Alexander H. Thompson | 10,000 | |
| VIRGINIA | Pugh | 4,000 | |
| | Tidewater Helicopter | 10,000 | |
| | J. S. Johnson | 10,000 | |
| | John C. Johnson | 10,000 | |
| | D. H. Woods | 10,000 | |
| WASHINGTON | | 10,000 | |
| | M. L. Hall | 10,000 | |
| | John D. Edwards | 100 | |
| | A. C. Schaefer | 4,000 | |
| WEST VIRGINIA | Walter F. Maynard | 12,000 | |
| | Trans World Airlines | 10,000 | |
| | Trans World Airlines | 10,000 | |
| WISCONSIN | Frank J. Gruen | 210 | |
| | D. W. Williams | 10,000 | |
| | J. L. Weston | 10,000 | |
| | John A. West | 10,000 | |
| | Harvey J. Arkansas | 10,000 | |
| | W. C. Williams | 10,000 | |
| WYOMING | Frank F. Nichols | 210 | |
| | John Morris | 10,000 | |
| | Edgar E. Allen | 10,000 | |
| | John D. Raymond | 10,000 | |
| | Edgar E. Nichols | 8,000 | |
| | Wyoming Airlines Corp. | 8,000 | |
| | Harry M. DeLong | 10,000 | |
| | New Reports | | |
| ALABAMA | James Tipton | 10,000 | \$10,000 |
| ARIZONA | W. M. Hayes | 15,000 | 12,000 |
| CALIFORNIA | Paul E. Storer | 8,000 | 8,000 |
| | Paul E. Storer, Jr. | 8,000 | 8,000 |
| | Thomas P. French | 1,000 | 1,000 |
| | Warren James | 40,000 | 40,000 |
| | Edgar E. Nichols | 10,000 | 10,000 |
| COLORADO | Frank Nichols | 10,000 | 120,000 |
| CONNECTICUT | Carl Jason Davis | 10,000 | 10,000 |
| | Robert E. Nichols | 10,000 | 10,000 |
| FLORIDA | J. B. Morgan | 10,000 | 10,000 |
| | John L. Wimberly | 10,000 | 10,000 |
| | John D. Nichols | 10,000 | 10,000 |
| HAWAII | Edgar E. Nichols | 10,000 | 10,000 |
| | John D. Nichols | 10,000 | 10,000 |
| | Paul E. Nichols | 10,000 | 10,000 |
| | Frank L. King | 10,000 | 10,000 |

Service Use of Oxygen

FEDERAL FIELD SERVICE USE OF OXYGEN. By F. R. Gandy. All Service Field Offices. \$1.00. Published by Office of Air Service, City of Washington. 15 pp. 22 illustrations.

In this circular is given a detailed description of the oxygen apparatus provided to supply oxygen to pilots at high altitudes. The oxygen is stored and carried in small steel cylinders. One can be purchased for \$10.00 per cu. in. Perfected for drying and cleaning the oxygen tanks it is recommended that the cylinders and regulators for mounting in the aircraft are other parts of the equipment described. Instructions for handling the apparatus are included.

An Air Mapping Contract

The International Aerial Engineering Co., Inc., 26 Broadway, New York City, has been awarded a contract by the U.S. Army Signal Corps, Fort Monmouth, New Jersey, for the aerial photographic mapping of approximately 250 square miles of previously unexplored mountainous land. The property is situated in the Magdalena Valley, Department of Santander, Colombia, South America.

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and service headquarters for the entire company. At Tampa, the company keeps four planes available for flying at all times. From Jan. 1 to March 16, these machines flew over 23,000 miles. 750 passengers were carried on short flights, during which 10 students received instruction in flying. All passengers flying there were amazed at the altitude which approximately 35,000 acres were mapped and adequate roads of numerous fountains, hotels, developments and new roads.



Planes of the McMillan Co. at Tampa, Fla., with some Florida Airways planes in the background.

Cross-country flights with passengers or express were made to the following cities: Palm Beach, 3 trips; Miami, 2 trips; Ft. Myers, 2 trips; LaBelle, 3 trips; Gainesville, 3 trips; Cocoa, 1 trip; Vero Beach, 5 trips; Jacksonville, 10 trips; Daytona, 4 trips; St. Augustine, 10 trips; Lakeland, 1 trip; Tallahassee, 2 trips; Wildwood, 2 trips; Webster, 1 trip; Haines City, 10 trips; Bahama Park, 2 trips; Easton, 1 trip; Atlanta, 2 trips.

Flights by the Frank Hayes organization, one of the largest sales organizations in Florida. Mr. Hayes uses planes primarily for displaying his property to prospective buyers, and also for advertising his business. He has a network of travel bureaus in his various branch offices. A short time ago he recently needed some special printing done in a

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Henri Bouché
editor

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J. D. Colquitt is in charge of the field at Tampa. J. W. (Hed) Hoffstein specializes in instruction and photographic work and E. B. Bangs is in charge of cross country passenger and express services. Bahama and Bangs were both Army flying instructors during the war and have had extensive experience in long distance and instrument flying. While Colquitt is one of McMillan's engineers who has made good and has been raised several times to his present position.

The A. B. McMillan Co. has been appointed authorized distributor for Lockheed airplanes and has already placed over New York.

These same day there was less than twenty planes permanently located in the State. Now there are at Miami, 20; Tampa, 15; St. Petersburg, 7; Jacksonville, 7; Daytona Beach, 6; Orlando, 5; Miami City, 4; Ft. Myers, 5; St. Petersburg, 4; Brooksville, 2; with about 20 more scattered throughout the State, including the lumberyards bays from the North. The above figures would flying boats as well as land planes.

DODGE NEWS

By J. A. McNamee

Flight news received on Saturday afternoon, March 26. Mr. Alexander received a telegram at 3:20 p.m. advising that his mother was dying in Kinston, N.C. The train had left at 3:30 o'clock and the car would not be until 11 p.m.

Our president, D. M. Alexander, with chief pilot Vanier stopped into an Englehardt at 3:45 and overhauled the tools at Fort Morgan, 40 miles away, thus saving 12 hours. We are sorry to say that his mother passed away before his arrival.

The owners, officers and everyone interested in aviation are working for plans for a Memorial Field.

We were very pleased to receive a visit from Dr. Rankin who has put through almost all of the Aircraft Companies in the country, and we learned a great deal from his observations.

J. A. McNamee will leave in a few days for Kansas City with a new Lockheed demonstrator.

Eugene Field, under the management of Earle Parker, is advertising all set for spring business, with new wings, new equipment, etc.

Norman J. Lee of Colorado Springs has been appointed dealer for souther Colorado for the Alexander Lockheed. Five students are taking instructions daily at the Alexander Airport, with a waiting list of ten.

Baldwin, Minn.

A. M. Neumann recently purchased an OXXS Standard from C. L. Heron of Peoria, Ill., and will fly the machine to his home town, a distance of 25 miles. The trip was made in 3 hrs. 16 min. non stop. In 1895 Neumann was engaged in commercial flying at Elizabeth, Alaska, for the Alaska Arctic Transportation Co. This meant many trips at high altitudes in a Home-built plane.

He is now building a larger, and will have about 20 tons of field to work from. Pilots are welcome at any time. Greetings old ad with three Models of field.

Pearce News

It is reported here that the Chicago-Elgin, Ill., Mail Pender line will stop at Pearce. The Mail will land at Pearce Airport, which through co-operation of the Association of Commerce also serves as a municipal Airport. A few finishing touches are being applied to the field, by grading and a short stretch of hedge, and something will be left of the rough spots and rolling down the surface.

Pearce Airport is located in the northern part of the town (about two miles from the Post Office). As is the case with the Verner Aircraft Co. has been flying for the past six years, but has never improved from house to how it is in mind for presenting any type of plane to us.

The Verner Aircraft Co. has a large class of students in their spring class, and are having quite a number of passengers.

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D
De Laval Air Service Inc.
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Dulleson Steel Co.

E
E. A. F. Manufacturing Co., Inc.
Dodgegreen School of Aeromotors

F
Hamilton Aero Mfg. Co.
Hawker Mfg. Corp.
Hoff, United & Co.

G
Inland, G. S.
Kingsley Corp.

H
Johnson Aviation & Supply Co.
Johnson Motor Products Inc.

I
L'Amendage
Louis Marmon Aircraft Co.
Lorraine Aircraft Corporation
Lorraine Edelmann Co.

J
Marine Co. The Glass Co.
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K
Nichols-Brayton Triplex Co.

L
Pitts-Jackson Manufacturing Co.
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M
S. F. D. Co. The
Tatius Auto Service Co., Inc.
Robertson Aircraft Corp.
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N
Sectra Magnate Co., Inc.
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Southern Airlines, Inc.
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Swanson, C.
Swanson School of Aviation

O
Takulana, Gen. E.
Taylor, C. Floyd
Tatius, Inc.

P
Walker Aero Co.
Where in Fly
Wendell Engineering Co.
Wright Aeronautical Corp.

R
Tucker Aircraft Co.

S
Stearman Aircraft Co.
Stearman Aircraft Corp.
Standard Aircraft Co.
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T
Teleco Air Service Inc.
Tucker Aircraft Co.
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D. B. Bon 5555, Tacoma, Philadelphia, Pa.

FIRE SALE—1935 Waco with new OXXO, a good buy at
\$1,500.00, serial lead cockpit canopy with front SST
gasoline magazines. Total 127 lbs. fuel, food, pilot, shelter and
motorcar carrying weight, complete w/ money carrying case,
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\$100.00. E. G. Rundquist, 3309 Grandview Ave., Detroit, Mich.

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New steel, just disassembly on short notice.
Hannibal, Thomas Dayley, 2443 N. 18th Street, Philadelphia,
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money would not decrease. M. J. Hunter, Memphis,
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with used three-place ship, with ample power, large wheels,
approximately 1000 hrs. Eichorn, 25 Hill Ave., White Plains,
N. Y.

WANTED—Plane with commercial builder or operator,
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